

## PATENT SPECIFICATION

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Complete Specification Accepted: Feb. 18, 1937.



## PROVISIONAL SPECIFICATION

## Machines for Treating Turf, Grassland and other Ground

We, W. HARGREAVES AND COMPANY LIMITED, a British Company, of Old Road, Cheadle, in the County of Chester, and WILLIAM HARGREAVES, a British Subject, of Glendaruel, Thorley Lane, Timperley, in the County of Chester, do hereby declare the nature of this invention to be as follows:—

This invention relates to machines for treating turf, grassland and other ground, and more particularly for piercing and aerating the same. In the past, machines for this purpose have been made with various types of non-rotatable piercing tools.

According to this invention we propose to utilize tools, preferably of a rotatable type such as a twisted drill, and to rotate them positively by mechanical means as they enter the ground. The machine may be either hand or power operated and it may include a frame structure or chassis mounted on wheels or rollers, and this supports a holder or cross-bar carrying the piercing tools. This holder or cross-bar is adapted to receive an up-and-down motion to cause the piercing tools to be inserted in and withdrawn from the ground, which motion can be imparted manually by the operator, and the piercing tools can be rotated positively by mechanism operated by power operated means. Also, there may be means for causing the entire machine on its wheeled or movable chassis to make a step-by-step movement over the ground between successive insertions of the piercing tools into the ground. The number of piercing tools used may vary, and they may be interconnected through gears, chains, or other means.

In a machine as outlined above and

adapted for manual operation, the chassis supports pivoted handles which can be worked by the operator with an up-and-down radial-like movement, through (preferably) a short arc, a connection from such pivoted handles operating the tool holder or cross-bar which is given an up-and-down motion and which may move in guides.

To control the feed of the machine, i.e. to give a step-by-step movement over the ground, we propose to arrange suitable ratchet mechanism or the like connected from the pivoted handles (or from a part movable therewith) to one of the axles on which is mounted wheels or rollers supporting the chassis of the machine. This ratchet feed gear or the like is arranged to come into operation while the piercing tools are out of the ground. By this means it will be seen that a step-by-step feed motion of the machine over the ground takes place while the piercing tools are out of the ground.

Where the machine is adapted to be operated by motive power, the piercing tools are rotated by the motive power through suitable reduction gearing. The driving motor can be mounted direct on the holder or cross-bar carrying the piercing tools, along with suitable reduction gearing.

The step-by-step feed motion of the power operated machine may be achieved by ratchet mechanism or the like as described in connection with the hand operated machine.

Dated this 5th day of September, 1935.

For the Applicants,

E. K. DUTTON & CO.,

Chartered Patent Agents,

5, John Dalton Street, Manchester, 2.

## COMPLETE SPECIFICATION

## Machines for Treating Turf, Grassland and other Ground

We, W. HARGREAVES AND COMPANY LIMITED, a British Company, of Old Road, Cheadle, in the County of Chester, and WILLIAM HARGREAVES, a British Subject, of Glendaruel, Thorley Lane, Timperley, in the County of Chester, do

hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

These improvements relates to machines

for piercing turf or greensward and the like, for the purpose of aerating the same, and concern a machine adapted to be mechanically advanced step by step and  
 5 which has a plurality of positively driven rotary drilling or boring tools carried in a movable support which is adapted to be downwardly stroked to effect drilling following each step by step advance.

10 The apparatus comprises a framework or chassis supported on wheels or rollers and includes a movable support to carry the positively driven drills or the like and is firstly distinguished in that the  
 15 forward mechanical movement of the framework or chassis is automatically controlled by the position or movement of the drill spindles whereby the advance step by step takes place so as to re-position the  
 20 machine whilst the drills are clear of the ground. Thus vertical movement of the drills effects the re-positioning, whilst the downward stroking permits the actual drilling to take place.

25 Further, the improvements make use of a lowerable and liftable gear box supporting the positively driven drills and means in combination therewith adapted to actuate mechanism to move the frame-  
 30 work or chassis a step to a fresh position. Further such lowerable and liftable gear box is well adapted to carry the motor which positively rotates the drills or the like.

35 There are also further features of construction which will be clear from the detailed description now given.

Fig. 1 is a front elevation of a machine for piercing turf or the like in which are  
 40 included the features already briefly mentioned.

Fig. 2 shows a plan view of Fig. 1.

Fig. 3 is a side elevation.

Fig. 3a is a detail view.

45 The drawings show a simple construction of framework or chassis consisting of strap *a*, pendent fork *a1* for the rear wheels *w1*, straps *a2* for the tray *a3*, and blocks *a4* fixed along with the plates *a5*  
 50 to the strap *a*. The blocks *a4* and the tray *a3* serve to secure the four upright bars *a6* each two of which pass through rods *a7*, the said elements constituting a rigid frame or chassis. The plates *a5*  
 55 have stub axles *a9* for the two fore wheels *w*.

There is shown a vertically movable gear box *b*, guided by the four bars *a6*, and on pillars attached to this movable  
 60 gear box *b*, the motor *M* is shown mounted and as having a horizontal disposition. Said gear box *b* may also carry the petrol tank *P*. The motor drives a shaft *b1* and gear wheel *b2* in  
 65 the vertically movable gear box, and

through a train of gears such as shown by Figs. 1 and 2, positively drives the rotary drills or tools *d* of which four  
 types are shown in Fig. 1, one being of gouge type, one of flat section and the  
 70 other two spiral. Said vertically movable gear box *b* has ear brackets *c1* which by long links *c* are connected to lever structures *c2* fulcrumed at *c3* to staying  
 75 members *c4*, *c5*, the lever structures *c2* being interconnected by a hand bar *c6* and cross-stays. If the hand bar *c6* and the lever structures *c2* be moved upwards  
 80 against the action of the adjustable or counterbalance tension spring *c7* the movable gear box *b* will be lowered and the  
 85 drills or tools will be stroked and, with the motor running, the drills or tools will be positively driven to bore the turf. The raising or return movement is partially  
 effected by the springs *c7*. More or less than four positively driven rotatable tools  
 90 can be used according to requirements and the number of gears in the movable gear box.

Means are provided to advance the machine automatically to a fresh position  
 step by step and such means are controlled according to the position of the positively  
 95 driven drills. When the drills are clear of the ground the movement of the drills through the supporting means therefor is utilized to operate through appropriate  
 gear to advance the frame or chassis. When the advance by a step is completed  
 100 the downward stroking action effects the actual drilling.

The drawing illustrates a construction of appropriate mechanism to achieve such  
 object. The movable gear box *b* is shown  
 105 fitted with adjustable angle plates *d8* which are lowered and raised therewith and they act on levers *d1* jointed at *d2*  
 to levers *d3* mounted about the stub axles *a9* such levers *d3* having a ratchet pawl  
 110 *d4* engaging a ratchet wheel *d5* in connection with and whereby the wheels *w*, *w* or rollers supporting the framework or chassis are automatically advanced when  
 the gear box *b* moves upwards. It is  
 115 clear that on the movement of the bar *c6* the mechanism described causes the frame or chassis to take a forward step (to re-position the machine ready for upward  
 120 actuation of the bar *c6* to effect stroking, and the positive boring of a fresh set of  
 holes by the downward movement of the gear box and positively driven tools carried thereby.

In order to allow the apparatus to be  
 wheeled where required when out of  
 action, a hinged or movable lever *e8* is  
 provided (see Figs. 1 and 3) which, when  
 upright, engages below the cross-rod *c9*  
 130 thereby enabling wheeling and steering to

be done. Also to limit the downward stroking motion, an adjustable screw-threaded stop such as c10 can be provided and which is shown at Fig. 3a.

5 Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

10 1. An apparatus for piercing turf and the like for aerating purposes and having positively driven drills or the like and distinguished, in that, the framework or chassis is controlled as to its advance by  
15 the position or movement of the drill spindles and is thereby automatically advanced step by step, whilst the vertical stroking of said drill spindles permits the positive drilling with the apparatus at  
20 rest.

2. An apparatus for piercing turf and the like for aerating purposes and having positively driven drills or the like and distinguished in that the framework  
25 or chassis is automatically controlled by the position or movement of the drill spindles or the like and is so advanced step by step, said drill spindles being adapted to be stroked or lowered by hand  
30 against counterbalance means and adapted to effect positive drilling.

3. An apparatus as claimed in Claim 1 or 2 and including a lowerable and liftable gear box carrying drills or the like adapted to be positively rotated and means  
35 operable through the movement of said gear box to actuate mechanism to advance the apparatus step by step when the drills are out of the ground.

4. An apparatus as claimed in Claim 3  
40 and including a lowerable and liftable gear box stroked to effect positive drilling and which is moved vertically to effect a step by step movement of the apparatus said gear box carrying the motor which  
45 drives the drills or the like.

5. Apparatus as claimed in any of the preceding claims and having movable means to permit the wheeling about and steering of the apparatus.  
50

6. Apparatus as claimed in any of the preceding claims and having means to limit the stroking effect.

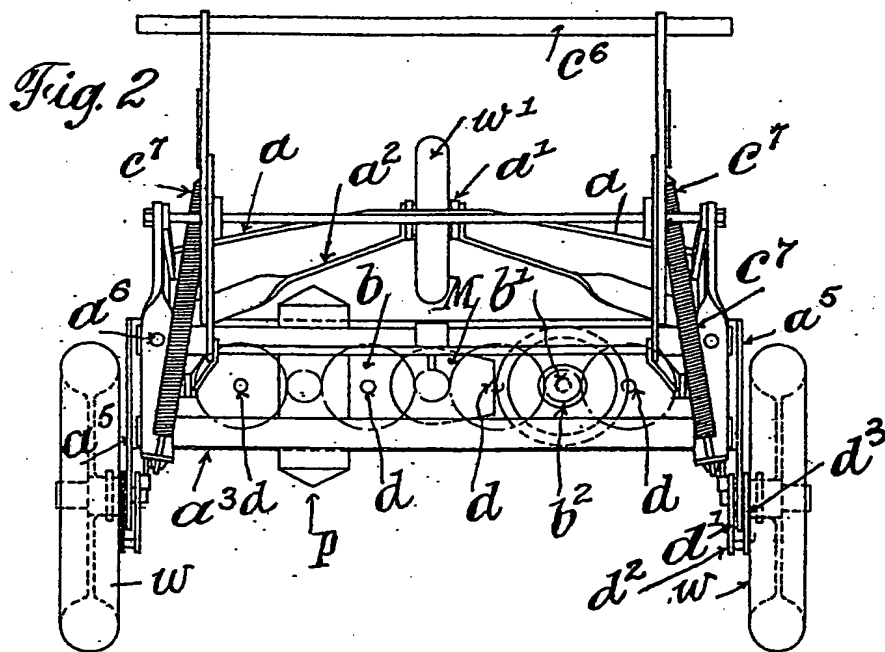
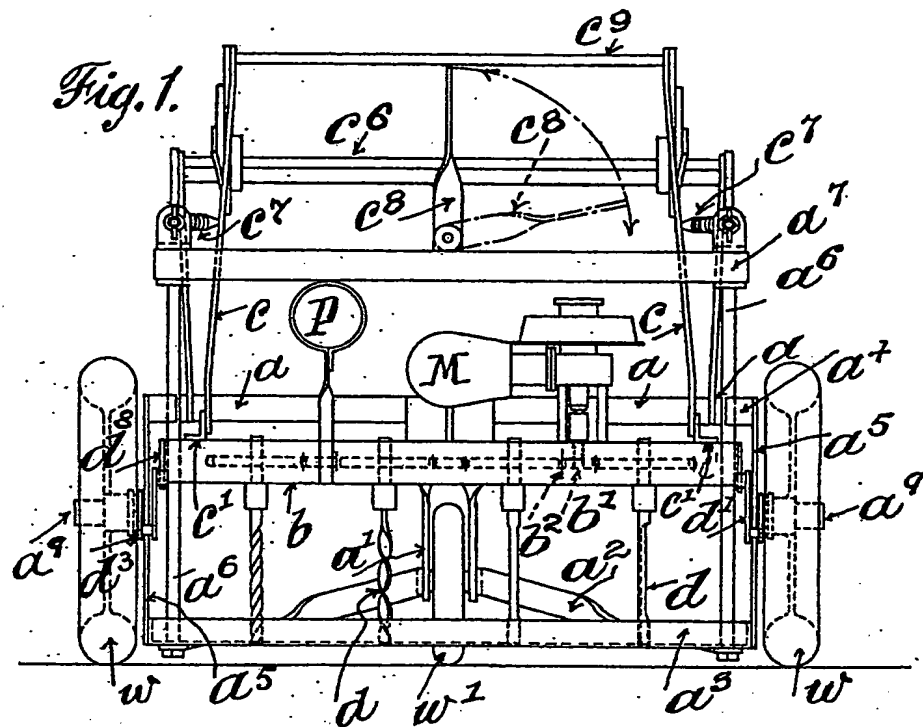
7. Apparatus for the purpose stated and as shown in and as described with refer-  
55 ence to the accompanying drawings.

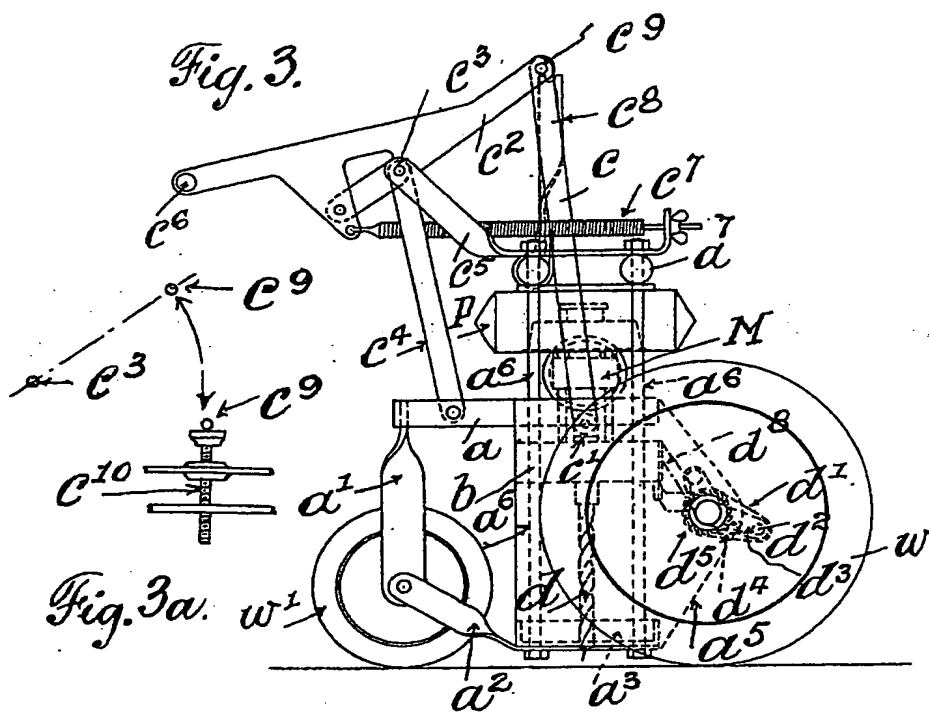
Dated the 18th day of August, 1936.

For the Applicants,

E. K. DUTTON & CO.,  
Chartered Patent Agents,  
5, John Dalton Street, Manchester, 2.

[This Drawing is a reproduction of the Original on a reduced scale.]





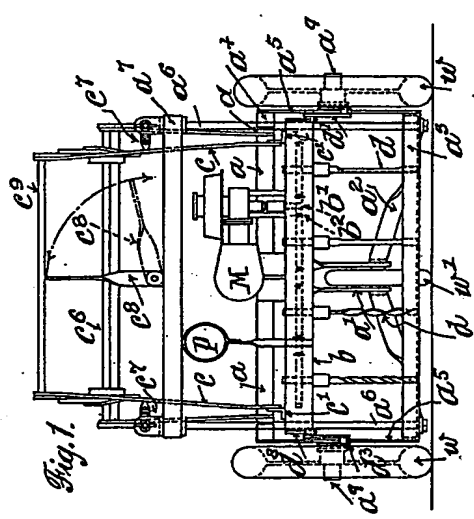


Fig. 1.

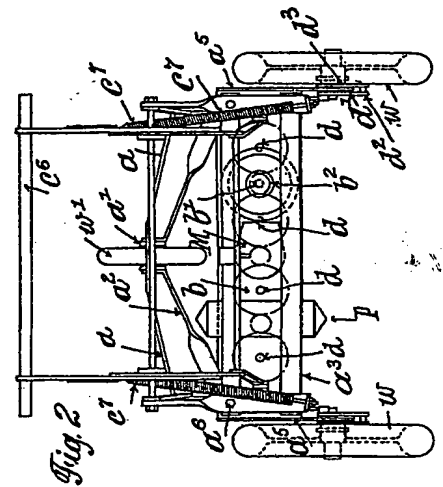


Fig. 2.

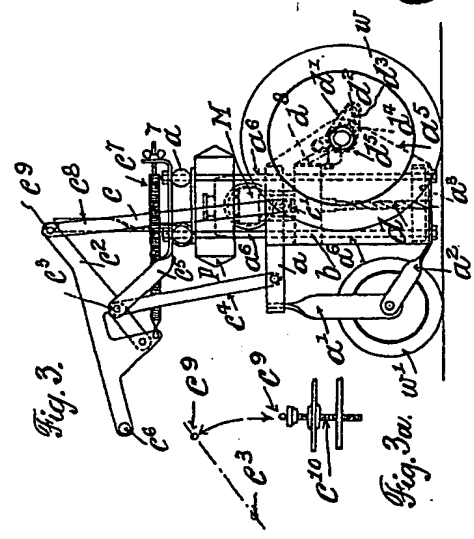


Fig. 3.

Fig. 3a.

[This Drawing is a reproduction of the Original on a reduced scale.]